SPE NEWS

Vol. 3 No. 8

October, 1947

NEW MEMBERS

BUFFALO
Members

ROLAND D. McDONALD, Vice President
Varcum Chemical Corporation
Niagara Falls, N. Y.

CENTRAL OHIO
Members

F. B. DAHLE, Supervisor
Battelle Memorial Institute
505 King Avenue, Columbus 1, Ohio

HORACE C. HAMLIN, Package Eng.
Anchor Hocking Glass Corporation
Plant 35, Lancaster, Ohio

ROBERT W. KING, Research Engineer
Battelle Memorial Institute
505 King Avenue, Columbus, Ohio

ROBERT A. RACHWALL, Plant Supt.
Welch Plastic & Mfg. Co.
814 W. 3rd Avenue, Columbus, Ohio

HENRY W. KUHLMANN
Battelle Memorial Institute
505 King Avenue, Columbus 1, Ohio

CHICAGO
Members

CHARLES BUCKMAN, Vice President
Eclipse Mfg. Co.
100 W. Chicago Avenue, Chicago, Ill.

ARCH. M. GIBSON, Field Engineer
Durite Plastics, Inc.
4851 S. St. Louis Ave., Chicago 32, Ill.

CLEVELAND
Member

RICHARD A. RYBAK, Sales Engineer
Plastics Engineering, Inc.
8506 Lake Avenue, Cleveland 2, Ohio
(Note: Mr. Rybak transferred from Junior to Member)

EASTERN NEW ENGLAND
Members

WALTER R. HICKLER, Research Chem.
Hood Rubber Company
Watertown, Mass.

FRED LANGHORST, Sales Rep.
Stanley Chemical Company
29 Ridge Avenue, Natick, Mass.

EDWARD B. ROBERTS, Tech. Supt.
Hood Rubber Co. (A Div. of B. F. Goodrich Co.)
98 Nichols Avenue, Watertown, Mass.

HUGH M. TOMB
Laminated Sheet Products, Inc.
259 A. Street, Boston 10, Mass.

GOLDEN GATE
Members

ROY F. ELKE, Supt.
Automatic Plastic Molding Co.
1368 Park Avenue, Emeryville 8, Cal.
7467 Badding Road, Castro Valley, Cal.

RICHARD A. FONTES, Partner-Manager
Advance Plastic Company
3509 E. 12th Street, Oakland 1, Cal.

LLOYD A. GRIFFITH, Owner
Griffith Tool & Die Company
4132 Anza Street, San Franciso 21, Cal.

KENNETH M. HOLLAND, Chief Chemist
Plastic Laminates, Inc.
25 Bay Street, San Rafael, Cal.

CLARK N. ROBINSON (Self Employed)
201 Telegraph Hill Blvd., San Francisco, Cal.

VERNON C. ROLLINS, Salesman
Monsanto Chemical Company
111 Sutter Street, San Francisco, Cal.

JOSEPH L. SHERK, Sales Engineer
Dow Chemical
310 Sansom, San Francisco, Cal.

NEWARK
Members

GEORGE TAYLOR HOWE
Susquehanna Plastics, Inc.
150 Fifth Avenue, Hawthorne, N. J.

WILLIAM HENRY PEACOCK, Asst. Lab. Mgr.
Calco Chemical Div. American Cyanamid Co.
83 Grove Street, Elizabeth, N. J.

NEW YORK
Member

JEROME SHIFFMAN, President
Standard Novelty Box Company
385 Gerard Avenue
New York 51, N. Y.

Associate

ABHAYAKUMAR M. GANDHI, Head of Planning Dept. T. D. Gandhi & Co.
Phaltan State, Dist. Satara, India
1511 S. Manhattan Pl.,
Los Angeles 6, Calif.

NORTHWESTERN PENNSYLVANIA
Member

LELAND L. BERRY, Secretary-Treas.
Guinn-Berry Corporation
2601 West 12th Street, Erie, Pa.

PHILADELPHIA
Members

JOHN J. KING, President
J. M. King Mfg. Co., Inc.
American and Diamond Sts.
Philadelphia 22, Pa.

JAMES STANLEY REX, Owner
Plastic Center
2015-17 Market St., Philadelphia, Pa.

ARTHUR A. SWANSON, JR.
Hercules Powder Company
Delaware Trust Building
Wilmington 99, Del.

ROCHESTER
Members

EMERSON HALL ALEXANDER, Sales Rep.
Richardson Company
1031 Sibley Tower Building
25 North Street, Rochester, N. Y.

EVERETT D. CRUMRINE, Sales Eng.
Insulation Mfg. Co., Brooklyn, N. Y.
Atlas Plastics, Buffalo, N. Y.
Creative Plastics, Brooklyn, N Y.
635 Melville St., Rochester, N. Y.

LAWRENCE M. LOVELESS, Asst. Pur. Agent
Stromberg-Carlson Co.
100 Carlson Road, Rochester 3, N. Y.

HARRY V. STEELE, Eng.
Auburn Button Works
48 Canoga Street, Auburn, N. Y.

ROCKY MOUNTAIN
Member

HOMER VERNON THOMAS, Agent
Formica Insulation Company
Manufacturer's Representative
1633 Emerson Street, Denver, Colo.
(Transfer from junior to member)

ST. LOUIS
Members

WALTER P. BUSSART, Sales Rep.
Tennessee Eastman Corp.
2000 Continental Bldg., St. Louis 8, Mo.

JULIUS SEILER, Vice President
K.S.H. Plastics Incorporated
2552 W. Sullivan Avenue St. Louis, Mo.

TOLEDO
Members

ROBERT W BLEE, Industrial
Electric Auto Lite Company
216 Kenilworth Avenue, Toledo 10, Ohio

NELSON BLOOM, Control and Production
Plaskon Division—Libbey Owens Ford Co.
2526 Glenwood, Toledo 10, Ohio

CLYDE B. SMITH, Application Engr.
Defiance Machine Works, Inc.
2325 Madison Avenue, Toledo 2, Ohio

EDWARD F. KORBACH, Plastic Fabrication
Electric Auto Lite Company
3733 Wyckcliffe, Toledo, Ohio

UPPER MIDWEST
Member

JEROME L. FORMO
Minneapolis-Honeywell Reg. Co.
2753—4th Ave. So., Minneapolis 8, Minn.

NON SECTION
Members

GEORGE S. NALLE, JR.
Nalle Plastics, Inc.
108-110 West 2nd St., Austin, 22, Texas

JOHN NORMAN KEMPF, Plastics Tech.
Fiberglas Canada Limited
220 Kensington Ave. South, Hamilton, Ontario

FRANK W. FULLER, Vice President & General Manager
Resinwood Products, Inc.
846 Summit Ave., St. Paul 5, Minn.

SOMABHAI MOTIBHAI PATEL, Managing Director
Plastics Corporation
Ajupura. Post-Anand. Gujarat
B.P. India

JOHN G. ROBB, Engineer
American Molding Co.,
355 Fremont St., San Francisco, Calif.

SPE NEWS

Issued Monthly to all Members of the Society of Plastics Engineers

Vol. 3 No. 8 October, 1947

PLASTICS-CHEMISTRY AND PHYSICAL PROPERTIES

By C. W. GAYLOR

There are about 100 basic plastics materials and synthetic elastomers. Such plastic materials are used in combination with a much larger number of fillers, plasticizers, binders, pigments and accelerators. The combinations of all the ingredients used in plastics mixtures makes possible the approximately 5000 grades and formulations now commercially available. It would be difficult for anyone to remember the names of the many formulations, to say nothing of their chemical and physical properties. Fortunately this is not necessary for two reasons. In the first place the use of these plastics materials has been highly concentrated in a limited number of basic types, such as phenol and urea formaldehyde, the alkyds, the vinyls, the acrylics and the cellulose derivatives, which are estimated to represent ninety percent of all plastics materials. Secondly, from a consideration of the chemical structure it is possible to make a fair approximation of the physical properties of a resin. The purpose of this paper is to show how the chemical structures of plastics are related to their physical properties.

With the variety of properties, characteristic and practical applications of plastics, it would be very beneficial to have comprehensive critical data arranged for convenient use. Such data have been compiled throughout the years for other materials long established in industrial use. The need for such treatment of plastics is understood and the slowness with which it is being reached is explained fully by the continuing creation of new plastics. However, until such data are set down in well organized form, which will be a long time if our industry continues to grow at the present rate, any engineer who would try new applications or a new resin will be greatly helped by some insight into the structure of the molecules which make up the plastic. This may appear difficult, and certainly it is not fully understood by anyone. But there are certain fundamentals which, if understood, will aid tremendously in making intelligent guesses. And if such knowledge does no other good, it is satisfying to know why certain plastics behave as they do while others behave differently.

Chemically, plastics are high polymers, that is, they are composed of large molecules made up from many small molecules (monomers). All high polymers are not plastics, however. The high polymers are classified as follows:

1. Rubbers—characterized by low modulus of elasticity (15 to 150 p.s.i.), 1000% extensibility. They are soft and deformable.
2. Plastics—have a moderate initial elastic modulus (1400 to 14000 p.s.i.), moldable at elevated temperatures. The physical properties depend greatly upon temperature and are responsible for the plastic character of such substances.
3. Fibers—are materials of high initial elastic modulus (100,000 to 1,000,000 p.s.i.), and a

(Continued on Page 7)

C. W. Gayler was born in Alabama in 1916 and educated at Howard College in Birmingham, The Georgia School of Technology and at the University of Texas where he received the Ph.D. in Chemistry. He is a member of the American Chemical Society, Society of Plastics Engineers, Society of Plastics Industry, Sigma Xi, Phi Lambda Upsilon and Pi Kappa Alpha fraternity. He has been active in the chemical industry since 1936, being employed by Swann and Co., Tennessee Coal, Iron and Railway Co. and the American Viscose Corporation where he is now in charge of plastics developmet.

SPE NEWS

Volume 3 Number 8

Published monthly except July and August by the Society of Plastics Engineers, Inc., under the direction of J. H. DuBois, Chairman, National Publications Committee.

Business Office—8506 Lake Ave., Cleveland 2, Ohio

JESSE H. DAY, Editor
CASE INSTITUTE OF TECHNOLOGY
CLEVELAND 6, OHIO

Editorial Advisory Board
J. H. DuBois **Carl J. Frosch**

G. C. Best, Western Representative
172 E. Lincoln St., Birmingham, Michigan

Sent free to all members—$2.50 yearly to non-members

NATIONAL OFFICERS SPEAK AT NEWARK

By EDWARD G. ACKERMAN

The first meeting of the current Fall season held October 8th began in a grand fashion. Over 200 members and guests were on hand to hear a series of short addresses by our National Directors and our National President, T. E. Orr. The speakers and their respective topics are as follows:

T. E. Orr—Spoke on the rapid growth of the SPE sections throughout the country and the concentrated effort this coming year to increase the membership in each section. Mr. Orr mentioned the importance of a local SPE section in the Baltimore-Washington area not only because the concentration of the industry there warrants such, but because of the important part such a section could play in an advisory capacity to the government in times of National Emergency.

R. B. Bishop—Delivered an interesting talk on the relations of Petroleum products to the Plastics Industry mentioning the fact that more and more plasticizers derived from petroleum are finding their usefulness in the plastics field.

A. G. Werner—Speaking on the type of programs found most satisfactory in the Chicago section stressed the importance of drawing speakers from the large users of plastics instead of those who sell plastics so as to give the meetings a balance not found when speakers are drawn from one side.

J. O. Reinecke—In his talk on Industrial Designing in Plastics stressed the importance of sound product designing towards making a product "desired" by the consumer. Proper design can increase the sales of an item as much as 25%.

R. J. Dailey—Discussed the plans for the forthcoming SPE Conference which is planned for January at the Rackham Memorial Building in Detroit. The conference is to be held on a strictly technical plane with none of the fan-fare and elaborate displays of last year.

Dr. P. Zottu—Gave a short resume of the use of high frequency equipment in the plastics industry and the various F.C.C. regulations governing the use of such. Manufacturers using such

(Continued on Page 5)

ROCHESTER SECTION IS ORGANIZED

By GEORGE A. PECK

Forty-two members of the Rochester and Buffalo sections met at the Hotel Rochester on September 16, 1947 to enjoy a turkey dinner and to organize the Rochester group. There were 29 of the new members of the Rochester Section present; the balance of the group were the Buffalo delegates.

At the conclusion of the dinner, Mr. Borro of the Buffalo Section gave a talk on the aims and principles governing the S.P.E. Mr. Cassidy, of the Buffalo Section, gave a short talk on the S.P.E. prize paper contest.

At the conclusion of these talks, organization of the Rochester Section was started at which time nine directors were elected. The steering committee was elected to the directorship as a body and five other directors were named. They are as follows: Harvey Bryans, Eugene Cathcart, Frederick Ciambrone, Vernon Howe, Dr. Garson Meyer, Edwin Mix, George Peck, Alfred Pundt, Dr. Vernon Whitman.

From the Board of Directors the following officers were elected for this year: Vernon Howe, President; Dr. Vernon Whitman, Vice-President; George Peck, Secretary, Harvey Bryans, Treas.

A short business meeting was held. It was decided that the third Tuesday of each month would be the regular meeting date and that for the next meeting, each member should bring a visitor. The next meeting is intended to be an open forum type of meeting at which questions will be answered on any problem which any group may have. Questions are supposed to be submitted to Mr. George Peck within the next two weeks and samples of parts about which the questions are being asked are to be forwarded, if possible.

The meeting was adjourned and the Board of Directors met, at which time they nominated chairmen for the following committees:

1. Section Membership Committee — Dr. Vernon Whitman.
2. Section Credential Committee — Frederick Ciambrone.
3. Section Nominating Committee — Chester Crumrine.
4. Section Finance Committee — Richard Hayes.
6. Section Program Committee — Eugene Cathcart.
7. Section House Committee — J. Windheim.
8. Section Publicity Committee — G. Gislason. L. Slocum.

It was decided that the chairman would appoint his own committee and each committee would consist of three or more members.

Conley Is Appointed

Fred Conley, Stephenson Building, Detroit, Michigan, founder and first president of the Society of Plastics Engineers, has recently been appointed representative in the state of Michigan for the International Molded Plastics, Inc., of Cleveland, Ohio.

LOCAL PRIZESOF $400 OFFERED BY BUFFALO AND ROCHESTER

By J. CLARKE CASSIDY, Jr.

An Annual Prize Paper Contest has been initiated by The Society of Plastic Engineers, Inc., national professional engineering society of the plastics field. The contest is designed to stimulate constructive and original thinking on plastics among young technicians and students under 30 years of age. Papers in this area are being solicited jointly by the Buffalo and Rochester sections of the Society under the leadership of a committee headed by Dr. George J. Goepfert of The Carborundum Company, Niagara Falls, New York. Awards totaling $900 are being offered, of which $400 have been contributed by Niagara Frontier industries for local-section prizes.

Papers submitted locally will be judged by a board of acknowledged plastics authorities. The author of the winning paper will be awarded a $250 first prize and his paper will be entered in the national competition. Second and third prizes offered by the local section are $100 and $50 respectively. All three papers will be presented at a Buffalo-section dinner at which all contestants will be guests. Entrants in the national contest will vie for a $500 first prize.

Final date for the submission of manuscripts is November 30. These manuscripts can not exceed 5000 words in length and may be on any subject of general interest to the plastics industry.

Area industries which have contributed to the award fund to date include Clinwell Plastics, Inc., Hy-Therm Plastic Molding Corp., and Molds and Manufacturing Co. of Buffalo; Norton Laboratorories, Inc., of Lockport; Durez Plastics & Chemicals, Inc., of North Tonawanda; Spaulding Fibre Co., Inc.. and Roe Tool & Die Co., of Tonawanda; Auburn Button Works, Inc., of Auburn; the local sales offices of Durite Plastics, Inc., of Philadelphia, Pennsylvania; National Vulcanized Fibre Co., of Wilmington, Delaware; and Michigan Molded Plastics, Inc., of Dexter, Michigan.

Serving with Dr. Goepfert on the prize paper committee are John E. Miner of the Spaulding Fibre Company, and Michael G. Dubenitz and J. Clarke Cassidy, Jr., of Durez Plastics & Chemicals, Inc. Rochester Section members of the committee have not yet been appointed.

LOW-PRESSURE LAMINATES TOPIC AT CENTRAL OHIO

By C. W. COOPER

The regular monthly meetings of the Central Ohio Section of the Society of Plastics Engineers were resumed on Friday, September 26 at 7 p. m. The opening meeting was held at the Columbus Athletic Club.

Following a dinner, the speaker for the evening was Mr. T. Walter Noble, manager, Plastics Di-

(Continued on Page 6)

PRUTTON IS CLEVELAND PRIZE PAPER JUDGE

By GEORGE B. KOCH

The Cleveland Section of the Society of Plastics Engineers held its first 1947-48 meeting on September 26th. The guest speaker was Robert M. Hornung, vice president, National City Bank, Cleveland, Ohio. Mr. Hornung spoke on "current business conditions".

The October meeting will be held at the offices of B. F. Goodrich Chemical Company, where it is planned to visit the sales service laboratory adjacent to the offices. Processing and testing equipment will be explained with a talk by Dr. F. K. Schoenfeld, vice president-technical of the chemical company.

Final details on The SPE Prize Paper Contest have been set and it now proves to be a very interesting proposition. The National first prize will be $500.00 and the Cleveland Section prize will be $50.00. The Cleveland Section Contest will be judged by Dr. Carl F. Prutton, Case Institute of Technology: Mr. E. Willard Pennington, Tech. Editor Industrial Plastics and A. Reynold Morse, Reed-Prentice Corporation.

Entries should be submitted to Dr. Carl R. Prutton at Case Institute of Technology, 10900 Euclid Avenue, Cleveland 6, Ohio, postmarked not later than November 30, 1947.

17 H-P-M's

...feed Western Electric's assembly line

Write for Bulletin 4405 describing the HPM 16-oz. machines.

Seventeen H-P-M injection molding machines feed plastic parts to this telephone assembly line. Two of them have been on this job for over ten years... evidence of the dependability of H-P-M equipment.

There's an H-P-M machine to handle your work ... injection, compression or transfer molding. Write for complete data.

HPM

All-Hydraulic

PLASTICS MOLDING PRESSES

COMPRESSION · INJECTION · TRANSFER · LAMINATING

THE HYDRAULIC PRESS MFG. COMPANY · Mount Gilead, Ohio, U. S. A.

NATIONAL PACKAGING GROUP IS FORMED: CHICAGO HEARS BRACKEN

By VAL WRIGHT

At the October meeting of the Chicago Section of SPE, held on October 7, W. O. Bracken, technical service representative for Hercules Powder Co., gave an illustrated talk on "The Stability of Cellulostic Plastics at High Temperatures and High Humidities." Mr. Bracken's address, covering test data on cellulose materials as well as polyvinyl chloride, polystyrene and methyl methacrylate, pointed up the fact that high acetyl cellulose acetate may be formulated to meet severe service requirements. His remarks were followed by a discussion period in which SPE members stressed the need for an over-all source of reliable information on the characteristics of various molding materials and their suitability for specific end use applications.

* * *

Organization of the national packaging committee of SPE was held at the Technological Institute of Northwestern University, Evanston, Ill., on September 30. Those in attendance included representatives of the material manufacturers, converters and end users of plastic packaging materials.

Set up after repeated requests from end users for more specific information on the use of newly developed plastic films and other materials in the packaging field, the new committee will cooperate closely with end users, devoting much of its attention for the present to problems relating to the packaging of meats and frozen food products. Laboratory facilities of the Technological Institute are being made available to the committee for the solution of specific packaging problems involving plastic materials.

William L. Hess, Anesite Co., has accepted the chairmanship of the new committee, which will function under Carl Frosch of Bell Telephone Laboratories, national chairman of the SPE consumer specifications committee. At the next meeting of the committee, to be held at the Technological Institute on November 4, subcommittees will be appointed to facilitate the work of the national committee. A large attendance of food industry packaging as well as representatives of material firms and converters is expected.

* * *

With the formation of the newly organized upper midwest section of SPE, the following members of the Chicago Section are transferring membership to the new section: Herbert Galloway, Minnesota Plastics Co., St. Paul; S. K. Moxness, Minneapolis Honeywell Regulator Co., Minneapolis; Russell V. Carlson, Precision Contacts, Minneapolis; Leo D. Felton, William Mahle, Northwest Plastics, Inc., St. Paul; Stanley Watson, Raymond Laboratories, Inc., St. Paul; and James H. Thomas. First meeting of the new Section was held October tenth.

NEW YORK SECTION HOLDS FIRST MEETING

By WILLIAM SCHACK

The first meeting of the New York Chapter, held at the Hotel Sheraton on September 9, was addressed by Michael A. Brown, Jr., newly appointed assistant publisher and editor of PLASTICS magazine, on the relation between plastics publications and the plastics industry. These publications have several well-defined functions, according to Mr. Brown.

The first is exchange of information, news, and technical data within the industry. Over a period of years the industry has come to appreciate the importance of this function, and most companies are willing to release data for general publication. This exchange accelerates the progress of the industry and has already contributed much in building its present status. Many companies which formerly were secretive have relaxed their policy in this respect.

The second function of the plastics press pointed out by Mr. Brown is to bring the story of plastics to other industries, thus providing them with the incentive to make greater use of plastics. Commercially, this is probably a more important function than the first, inasmuch as it builds a growing market for plastics and products and parts that are made of these materials. In performing this second function, plastics publications must be interpreters rather than mere reporters of what is happening in the utilization of plastics to yield lower costs, greater sales, better design and more durability in the products of virtually every industry.

ST. LOUIS SPONSORS COURSE FOR RETAILERS

By J. MAVER FEEHAN

Due to a change in the plans of Warren Prince, it was necessary to omit him from the program On September 24th and use instead the seminar that was originally scheduled for October.

The October program will be an evening meeting (no dinner) at 8:00 P. M. at the Melbourne Hotel with Mr. Kurt Emde, Chief Mechanical Engineer, Zenith Radio Corp., Chicago, Ill., speaking on "Selling the Industrial User of Plastics".

This is a little different slant on plastics as we will hear from a user of plastics who will give us some of the reason his company uses plastic molded products.

The Saint Louis Section has joined with the Associated Retailers of St. Louis and the St. Louis Board of Education in sponsoring an eight session course in Modern Plastics. C. Todd Clark, the Section president, is chairman of the course which will feature a knowledge of plastics every salesperson should have, including advantages of various kinds of plastics, their identification — getting acquainted with trade names — use of plastics in textile treatments — dos and don'ts of handling plastics.

National Officers Speak at Newark

(Continued from Page 2)

equipment at the present time may conform to the F.C.C. regulations by either using narrow bands or shieldings on their equipment.

T. E. Richards—Speaking on the various types of meetings held and their respective interest rating, pointed to a two speaker program as the type best received by members. Two addresses on topics of various phases of plastics are bound to interest a greater number of people.

M. J. Petretti—In his discussion of Large Molds versus Small Molds brought out some very interesting facts in production methods of various types of electrical wiring devices in the compression molding field.

W. Dunnican—In reporting the growth of various New England sections stated that the Bridgeport Section which is due to start within a few weeks will give the SPE a blanket coverage of the New England area.

A. E. Russel—Distributed "Resin Grade Selection Tables" to all present and discussed the importance of selecting the proper grade of resins for laminating and the various physical properties to be considered.

Philip Marvin—Spoke on the SPE Constitution and the controversial issues which have been settled. He urged that everyone who had suggestions on the way in which the constitution could be improved should write to the National Headquarters.

Paul F. Corbin—Gave a candid and interesting picture of the types of materials and methods used in coating fabrics with plastics. It was interesting to hear of the immense quantity of liquid resins used in this particular phase of the industry.

* * *

For those who have not yet contracted for advertising space in the forthcoming December issue of SPE News which is being sponsored by our Newark Section, it is urged that you contact immediately either Ed Soules at Eliz. 3-5840 or Ed Ackerman at Summit 6-6100. Everyone's cooperation is requested to make the Newark issue a huge success.

Details of our next meeting have yet to be announced but you may rest assured that John Curries has arranged an interesting and informative evening. The next meeting, as per usual, will be held the second Wednesday of the month, November 12th, at the Newark Athletic Club.

THREE RING BINDER

This two-stage lock, prong binder, for 8½" x 11" paper, is built for convenience and service.

In Brown and Gold.

for

Technical papers
Advertising copy
Price sheets
Office data
Sample literature
Reports
Meeting notes

$1.00

Originally made to sell for much more.

SPE
National Office
8506 Lake Avenue
Cleveland, Ohio

NORTHWEST PENN. HEARS TOEPEL AND HARPER

By N. E. REYBURN

On September 11 the Northwest Pennsylvania Section held its first meeting of the fall season at the Uthmann Chor in Erie. Twenty-five members and guests attended the dinner and a talk by Mr. Walter Toepel and John Harper of Parker Kalon.

Following this was a movie by Mr. McDaniel of Tennessee-Eastman.

Mr. Loranger announced the results of this Section's choice of meeting subjects for the balance of the year, and Mr. Laurenson announced the October meeting which was held in Oil City at the Hotel Arlington on October 8.

Mr. Roche announced the contest being held on a technical plastic paper to be written by November 30.

The list of new members for this Section who had joined since our last meeting cover the following: L. L. Berry, Donald Blair, Ralph Dudley, Max English, Harold George, Vincent Juliante, George Sterling, James Vollant.

New applications were received from Fred Mahaffey and Willis Loding.

Low-Pressure Laminates Topic at Central Ohio

(Continued from Page 3)

vision, Fabricon Products, Inc., River Rouge, Michigan. Mr. Noble, who is a popular speaker on plastics and who is widely known, spoke on "Low-Pressure Laminates". Fabricon Products, Inc., formerly the Detroit Wax Paper Co., is one of the leading producers of sheet materials used in commercial laminating processes. They manufacture fabrics and papers impregnated with commercial phenolics, polyesters, melamines, etc.

The program arrangements were in charge of R. L. Savage, Program Chairman, and F. B. Hill, Jr., local member of the House Committee.

There were 23 members and 18 guests present, and one nonmember joined at this meeting.

A discussion was held in regard to probable papers from the Central Ohio Section for the national meeting in January, 1948, and an announcement was made about the prize papers contest.

Authorship in Central Ohio Section

Three books have appeared relatively recently under the authorship of five members of the Central Ohio Section.

"Synthetic Resins and Rubbers" by P. O. Powers was published by John Wiley and Sons, Inc., New York in 1943.

A more recent book "Applied Plastic Products Design" was co-authored by R. D. Beck and R. L. Davis, and was published in 1946 by Prentice Hall, New York.

A third book by J. S. Hicks aided by R. J. Francis, "Low-Pressure Laminates", has been published this year by the Reinhold Publishing Corp., New York.

DETROIT HAS GOLF MEET

By FRANK ABBOT

The annual President's Golf Trophy was won by Mr. Charles Hamilton. The tournament was held on September 12, 1947, at the Glen Oaks Country Club. Forty members were on hand to compete for the championship and trophy award. However, it was conceded that the two main competitors for the trophy were Mr. William McArthur, winner in 1946, and Mr. Charles Hamilton, winner in 1945. Both of these men were battling to win permanent possession of the coveted President's trophy. It was a close match as Mr. Charles Hamilton turned in a 76 score and Mr. McArthur had a 77. These scores were unexpectedly low because the course was very wet from the heavy rains the day before.

Walt Noble, center, presenting to Charles Hamilton, left, President's Golf Trophy with William McArthur, runner-up, joining the group.

A larger group was on hand for the steak and fish dinner — sixty odd members and guests attended. Prizes were awarded for other types of accomplishment such as, longest drive with a putter and the low net scores.

Future meetings were discussed and the program committee has many interesting plans. The Detroit Section meets on the fourth Friday of the month, October 24, at 6:00 P. M.

NASH-KELVINATOR ENTERS PLASTIC FIELD

From SEPT. 22nd "DETROITER"

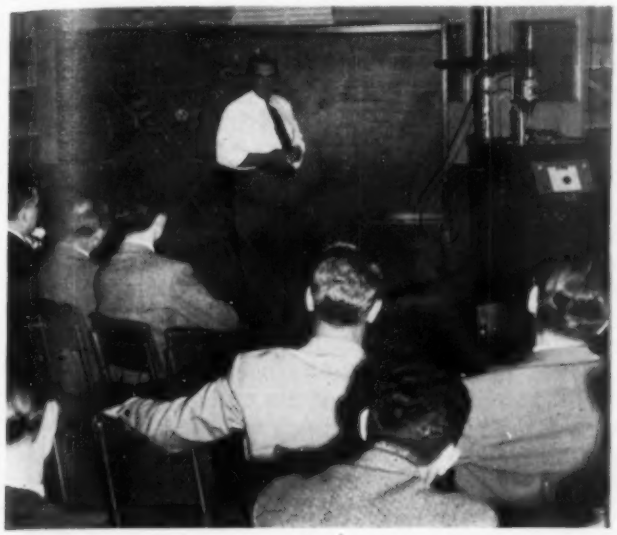
Formation of a Plastics Division of Nash-Kelvinator Corp. is announced by R. A. DeVlieg, vice-president in charge of manufacturing. The company has been experimenting with plastics production machinery for several years, DeVlieg said, and recently converted an existing Nash-Kelvinator plant in Milwaukee to handle this phase of its operation.

W. F. Poupard, who has been in charge of the Nash-Kelvinaor plastics program since early in 1946, will supervise the Milwaukee activity. A. E. Karus is factory superintendent.

TOLEDO NEWS

By A. E. GIESLER

At the September 17th meeting in the Owens Illinois Glass Company clubrooms Mr. Fred Cammanns Jr. of the Clinton Machine Company give a talk and demonstration on Metal Disintegration.



The Toledo Section held a meeting on October 20th at 8:00 P. M. in the spacious Owens Illinois Glass Company clubrooms located in the Ohio Building in downtown Toledo.

Mr. J. Southwell of the Bakelite Corporation was the featured speaker of the evening. Mr. Southwell talked on Polyethylene and Vinyl Elastomers.

NEW ENGLAND NOMINATES

By GEORGE W. MARTIN

The first meeting of the fall season for the Western New England Section was held September 9th, at the Hotel Sheraton in Springfield, Mass.

This was an open meeting and invitations had been extended to members of S.P.I.

Mr. Petretti called the meeting to order immediately after the dinner, and called for a report of the nominating committee. The following list of nominees was submitted by the committee chairman, George W. Martin.

These members are candidates for election as section Directors: R. E. Boch, Heald Machine Co., Worcester, Mass.; L. F. Hanson, Rogers Corporation, Manchester, Conn.; E. W. Vaille, Bakelite

(Continued on Page 8)

PHILADELPHIA EVENTS

By S. J. NOCITRA

A short business meeting preceded the regular meeting held in the auditorium of the Franklin Institute.

Mr. Bishop proposed that our chapter sponsor a local S.P.E. Prize Contest Paper awarding $50.00 as first prize and $25.00 as second prize, then submit these prize winning papers as our local chapter's entries in the national contest. A motion was made and seconded, and approved by all present, that members donate in order to raise the $75.00 required for prize money.

Mr. Bracken announced that four new members had joined our chapter since the last meeting, and that his membership committee is still soliciting prospects.

Mr. Beshgetoor read a letter he received from National S.P.E. president, Mr. Thomas Orr, commending our local chapter as being one of the most active and enterprising of all S.P.E. Chapters.

The program of the evening "A Symposium on Vulcanized Fiber" was under the direction of our Mr. Gerald H. Mains. Our guest speakers and the categories were as follows:

Mr. J. N. Farnum, Chief Chemist—Mfg. Processes. Taylor Fibre Co., Norristown, Pa.

Mr. E. A. Russell, Asst. Manager—Properties. Spaulding Fibre Co., Tonawanda, N. Y.

Mr. E. O. Hausmann, Director of Tech Control —Applications. Continental Diamond Fibre Co., Newark, Del.

Mr. H. T. Lundquist, Chief Engineer—Fabricating and Forming. National Vulcanized Fibre Co., Wilmington, Del.

Plastics – Chemistry and Physical Properties

(Continued from Page 1)

low range of extensibility (10 to 20%). Their mechanical properties are practically independent of temperature over a wide range (-50 to 150°C.).

Normal organic compounds such as alcohol, aniline or cane sugar have molecular weights ranging from 50 to 500. In contrast high polymers have molecular weights ranging from 20,000 to several hundred thousand.

High molecular weight is a fundamental prerequisite for good plastic, fiber or rubber proper-

(Continued on Page 8)

THE MISKELLA Infra-Red COMPANY
Designers-Manufacturers of
INFRA-RED OVENS · APPLIANCES · SECTIONAL UNITS · MACHINES AND CONVEYORS
TELEPHONE: HENDERSON 2210
CABLE ADDRESS: Infra-Red
MAIN OFFICE AND LABORATORY
EAST 73RD AND GRAND AVENUE
CLEVELAND 4 OHIO

Plastics – Chemistry and Physical Properties

(Continued from Page 7)

ties. Table No. 1 shows the molecular weights of some common polymers.

Table No. 1. Molecular Weights and Polymerization Degrees of some High Polymers. (Ref. No. 1)

Material	Weight Molecular	Degree Polymerization
Cellulose (cellophane)	50,000- 60,000	300- 500
Natural rubber latex	140,000-210,000	2,000-3,000
Nitro cellulose (molding)	400,000-700,000	1,500-2,500
Nitro cellulose (extrusion)	150,000-300,000	600-1,200
Nitro cellulose (coating)	50,000-100,000	200- 400
Polystryene (molding)	120,000-180,000	1,200-1,800
Polyethylese	18,000- 20,000	600- 700
Polyvinyl chloride acetate	10,000- 30,000	150- 500
Polyhexamethylene adipamide	16,000- 32,000	70- 140

The molecular weight of both natural and synthetic polymers can be adjusted within wide ranges to give products with properties designed for special uses. In table 1, three ranges of nitrocellulose have been included. The effect of molecular weight on properties will be made apparent later in this discussion.

The chain character of the molecules of high polymers is the second prerequisite for plastics properties. Natural polymers such as rubber, cellulose and silk are built up of long chain-like molecules. The same is true of synthetic high polymers, such as vinyls, acrylics and polyamides. The effect of the shape and length of the chain on ultimate properties will be discussed below.

The internal flexibility of chains is another fundamental property of rubbers, fibers and plastics. This includes rotation about single bonds (connecting links between atoms in a chain of atoms). There is theoretically free rotation about these bonds, but in practice there is a certain amount of interference with this rotation caused by substituent groups along the chain. The degree of freedom of rotation depends on the size and shape of the substituent groups. These can be varied by chemical modification. The effects of various groups will be shown later.

Above it was pointed out that long, flexible chain molecules are required to produce a plastic. This is not all that is required, however, as will be apparent presently. Let us consider the molecular properties which distinguish plastics from rubbers and fibers and which distinguish one plas-

New England Nominates

(Continued from Page 7)

Corporation, Hartford, Conn.; A. Westhead, General Electric Co., Pittsfield, Mass.; G. W. Whitehead, Improved Paper Mach. Corp., Nashua, N. H.; S. L. Young, C. F. Church Mfg. Co, Monson, Mass. Following this, Mr. Donohue introduced the guest speakers, Mr. Islyn Thomas, president of Thomas Manufacturing Co., and Mr. E. Spitzig of the Newark Die Co. Their subject was "Advantages and Limitations of Die Hobbing". The talks were finely illustrated by slides which clearly showed the various typs of hobs, hobbings, and hobbing presses.

An interesting feature of the talks was the "dos and don'ts" of designing hobs. Here they stressed the elimination of the common practice of putting large, heavy bases on hobs. Usually this base hinders the proper "closing in" operation which is so often necessary in making good hobbings.

Proper steel, as many fillets as possible, maximum permissible taper or draft, highly polished surfaces and no undercuts were considered as very essential items to be considered.

The talks which were highlighted by intermittent sparks of humor, instigated interesting and extensive questions and discussion. This was handled in a very adept manner by both Mr. Spitzig and Mr. Thomas.

The discussion was followed by the New Jersey Zinc Company film on "Zinc Alloy Die Casting". As this method of high speed production is one of the closest competitors of plastic molding, it proved to be of natural interest to the members.

tic from another. The difference between the classes of polymers is to a large extent caused by the magnitude of the attractive forces between the long chain molecules and by the ease with which the chains fit into a regular pattern (crystallize). If the chains are of such a size or shape that they will not fit closely together, the material is a rubber. If the chains are of such shape that they fit very close together the material is a fiber. Plastics usually lie between these two extremes.

The force between chains is usually expressed in calories. If the force is strong, say above 5000 calories per mole of the group involved (unit of chain), it will dictate the character of the polymer and the material will be a fiber. This is true of cellulose, proteins and polyamides. This force can be visualized mechanically by imagining two ropes lying side by side with magnets attached to the ropes. The magnets attract each other and the force required to pull the two ropes apart is proportional to the strength of the individual magnets and to the number of magnets per unit length of rope. The long chain molecule is represented by the rope and the side groups along the chain correspond to the magnets. The various chemical groups which may be attached to the chain have varying degrees of polarity, that is electrical unbalance. A highly polar group such as Cl in vinyl chloride or CN in acrylonitrile will have a high attraction for other polar groups. Therefore the analogy between polar groups and magnets is not at all far fetched. As a matter of fact, the polar forces obey the same laws of magnetism as iron magnets. The attractive force is inversely proportional to the square of the distance between them. The cause of this polarity is beyond the scope of this paper. For our purpose it will be sufficient to list the attractive forces between various groups and to understand that this is one factor permitting the many modifications of the fundamental chain.

Table No. 2. Attractive forces of various groups.

(Ref. No. 1)

Polymer	Group	Molar Cohesion
Polyethylene	(CH_2)	1,000 cal./mole
Butadiene	(CH_2), (CH=CH)	1,000
Rubber	(CH_2), (CH=C. CH_3)	1,300
Polyvinyl Chloride	(CH_2), (CHCl)	2,600
Cellulose	(OH), (--O--)	6,200
Cellulose Acetate	($OOCH_3$,) (--O--)	4,800
Polyamides	(CHR), (CONH)	5,800

The strength of the carbon to carbon bonds in a chain is about 70,000 calories. Comparing this value with the molar cohesion forces listed in table 2, it is obvious that when a plastic specimen breaks, it is the polar forces between chains which give way and not the primary bonds of the chain molecules.

The bulkiness of chain is also an important factor in determining the properties of a high polymer. The attractive force in effect is dependent on the size and shape of the side groups. Two magnets which are placed far apart exert no appreciable attraction for each other. In the same way if the shape of a polymer molecule is such that the polar groups cannot come close together their influence is weakened. The groups along the chain can be of various sizes. The larger the groups the farther apart the chains must be and the weaker the attraction between the chains. It should be remembered here that some groups are non-polar and, having no attraction for other groups, serve only to separate the chains. Some large groups, although having great attractive force, hold the chains apart so that there are fewer points of attraction per unit cross section. The attractive force may be modified by substitution. Polyethylene, which may be thought of as the fundamental chain from which all other linear polymers are derived, is weakly polar. It crystallizes under the influence of comparatively weak forces because the chains pack so well. There are no large side groups to interfere. Therefore polyethylene has a greater tensile strength than could be accounted for by attractive forces alone.

H H H H H H
-C-C-C-C-C-C-
H H H H H H
POLYETHYLENE

On the other hand, vinyl polymers are almost covered with polar groups. Polyvinylidene chloride, polyvinyl chloride, and polyacrylonitrile are extremes of polar concentration. The interchain attraction is often so high that the polymers are extremely brittle and infusable. Polyacrylonitrile is a good example of this. It is insoluble in ordinary solvents. It melts in air with decomposition at about 300°C. To use a polymer of this nature these strong forces must be modified. One may introduce less polar side groups. This modification is exhibited in polymethacrylonitrile which softens at about 115°C and is soluble in ordinary solvents.[3] The methyl group replaces the H and insulates the strong CN dipoles from each other.

Polystyrene offers other examples of chain modification. The large phenyl groups, although having some polar attraction, separate the chains so much that these forces cannot come into play to a very great extent. However, when the phenyl group is modified with two chlorine atoms, which are highly polar, the result is polydichlorostyrene.

(To Be Continued Next Issue)

REFERENCES

1. Mark, Herman F.; Advancing Fronts in Chemistry, Vol. 1, p. 7, Reinhold (1945).
2. Baker, William O.; Ibid. p. 105.
3. Price, C. C.; Ibid. p. 37.
4. Ott, Emil, Ibid. p. 85
5. Fordyce, C. R., and Meyer, L. W. A., Ind. Eng. Chem., 22, 1053-60 (1940).
6. Redfern, C. A. Brit. J. Plastics 5, 238 (1933).
7. Bhattacharya, R., Chem. and Ind. 1940, 325.
8. Modern Plastics, 23, No. 10, p. 144 (June 1946).
9. Modern Plastics, 23, No. 11, p. 146 (July

NATIONAL ANNUAL TECHNICAL CONFERENCE

of the Society of Plastics Engineers

JANUARY 21 - 23, 1948 DETROIT

AT THE HORACE H. RACKHAM EDUCATIONAL MEMORIAL

TECHNICAL SESSIONS . Jan. 21-23, 9:00 a.m. to Noon

CONFERENCES . . Jan. 21-22. 1 to 6 p.m., Jan. 23, 2 to 9 p.m.

Featuring new materials and developments with special reference to Automotive and Refrigeration Industries

CONFERENCES — By participating companies, clients and engineers in the Banquet Hall. Maximum of two 10′ by 10′ spaces will be assigned to participating companies. New products and developments may be featured in these conference spaces. Current plastic moving pictures will be shown in the afternoons in the Auditorium.

Open to SPE Members and those interested in Plastics Engineering. All Plastics Engineers are invited to attend Technical Sessions and Conferences upon registration. Admission to the Conferences will be by invitation of members and participating companies.

Annual Meeting — January 22, 1130 a.m.

COMMITTEES

General Chairman	R. G. Dailey, Wolverine Plastics, Inc., Milan, Mich.
Vice Chairman	Phil Robb, Hercules Powder Co., 628 Fisher Bldg., Detroit 2, Mich.
Publicity	Richard Walsh, Monsanto Chem. Co., 427 Fisher Bldg., Detroit 2, Mich.
Registration	Carl Whitlock, Monsanto Chem. Co., 427 Fisher Bldg., Detroit 2, Mich.
Hotels	Paul Lillis, Bakelite Corp., 807 Stephenson Building, Detroit 2, Mich.
Secretary-Treasurer	Anthony D'Agostino, 818 Hancock Ave., West, Detroit 1, Mich.
Program Publications	J. H. McGowan, Bakelite Corp., 807 Stephenson Bldg., Detroit 2, Mich.
Educational	E. W. Tillotson, Wayne University, 400 W. Warren, Detroit 1, Mich.
Exhibits	John Koons, Chairman, Am. Plastic - Ind. Engr. Corp. 414 Curtis Bldg., Detroit, Mich. M. R. Gerow, Vice Chairman in Charge of Exhibit Sales, Hercules Powder Co., 500 Fifth Ave., New York, N. Y. Don Hofman, Vice Chairman in Charge of Operations, 818 West Hancock, Detroit 1, Mich.
Reception	Karl Kithil, 610 Stephenson Bldg., Detroit 2, Mich.
Speakers	Carl Frosch, Chairman, Bell Telephone Lab., Murray Hill, N. J. Gunnar Lindh, Vice Chairman, Udylite Corp., 1651 E. Grand Blvd., Detroit, Mich.

Make Conference Reservations Now — Only 50 Spaces are Available

HOTEL RESERVATIONS SHOULD BE MADE PROMPTLY

The Riehl Printing Co. Cleveland 13, Ohio